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No other twin-engined plane approaches its speed



THE new Martin Bomber for the U. S. Army is truly a pioneer—a noteworthy addition to the long listing of achievement of the Martin organization. In the summer of 1932 the Army approved the basic design—encompassing new Martin design concepts in wing, landing and tail construction. Two years of engineering development as the Martin Plant brought the design to completion. And today new standards of performance were introduced in the new wing world.

The new Martin Bomber is, by a wide margin, the fastest twin-engined plane ever built. It could cross the United States from Baltimore to San Francisco in 15 hours. If converted for transport use, it would carry 25 passengers. It makes 215 miles per gallon of fuel, although it weighs as much as a big ton and travels four times as fast. It will climb to nearly 4,000 feet under full load on one engine—with both the pilot off the cockpit bar!

These and other new performance qualities are the result of important new Martin developments in aerodynamics, in structures, in control, in propeller efficiency. And these discoveries of Martin engineers, although applied first to a military plane, have an important peacetime significance. For transport operators they point the way to a great stream in pay load per mile per hour. Applied to commercial planes, they will make air transportation for men, cargo, mail efficient and more profitable than the best that we know today.



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AVIATION
FOR AUGUST 1933

In 1933, even more than in past years, the story of the National Air Races is an engine builders' story. Never before has there been such a dearth of aerodynamic improvement as during the period between the last two races. With the brilliant example of transport plane development in recent months to serve as a stimulus, some of the principles involved ought to find application in next year's racing planes.

Power for performance at the National Air Races

By Franklin R. Collbohm and W. B. Oswald

THE 1933 National Air Races held at Los Angeles proved very disappointing to those who anticipated a succession of some of the latest developments in aerodynamic design. The ships participating in the races showed no advancement and no new features over those in last year's Air Races at Cleveland. There were only two new ships on the field, the majority of the planes being those used last year without modification or with merely an increase in horsepower. The new ships were both powered with four-cylinder Monocoups, the one built by Art Chester being driven by himself, while the Larry Brown entry was piloted by Les Miles.

Speed by brute force

During the past year, much of the racing plane designs have concentrated their efforts on getting additional power and have left credit for improvement in performance to the engine manufacturers. The only noticeable trend in the design of racing planes is the increase of speed by brute force.

There are several outstanding examples of this trend that are probably

numbered to all who read the clubs papers. One is the newly designed Wasp-powered Go-Biter which last year won the last-place speed record of over 204 m.p.h. in the hands of James Doolittle, and which was this year reworked to take a supercharged Hartzel. Another Go-Biter, last year powered with a Wasp, its engine was stepped up to speed for these races by changing over to a Wasp Jr. However, due to the unfortunate mishaps which occurred during their participation in the Buick's transcontinental race number of these ships arrived in Los Angeles to take part in the closed-course speed events there. Because Turner's Waddell-Williams Special, the fastest plane in the races this year, had been damaged in New York, it, to Wasp, Jr. power, was left near its maker, giving it considerably better performance. As either of the high speed Go-Bites got through to Los Angeles, there was practically no competition for the Waddell-Williams machine. The general interest was therefore concentrated, to a large extent, on the smaller ships powered with engines in the 305 and 350 cubic inch displacement classes.

The small plane entry, of course, much more closely examined and demanded the spectators with very interesting and exciting individual contests. These groups showed a great performance of Monocoups as-cooled in-line engines, of both the four and six cylinder types. In fact, only one plane in this class was not Monocoup-powered—Williams' "Chief Outboard," with a 130-hp. Canard.

In and out of cow pastures

Williams performed the remarkable feat of flying this little machine all the way from Wisconsin to Los Angeles. To realize the significance of this achievement one must understand that the Chief Outboard had very much the shortest wing span of any plane present at the races, or only 34 ft. 4 in. The wing area is just 43 sq. ft. The flying of one of these little 302-cu. racing planes 'in and out of cow pastures all the way across the country,' as the race announcer described it, indicates that they may be good for something other than cow-punching jobs at top speed, given a good enough pilot. For ships in the smaller displacement classes, the

ness it is apparent that the phase of aviation will result in a narrowing degree in business expenditures.

The inherent appropriations for the Air Reclamation Department should result in more increased efficiency rather than in any harmful instruments of expansion.

Rex Martin

Director for Airways

IS TAKING over the direction of the Federal Airways System I am impressed with the efficiency with which that great system presently operates, the magnitude of its responsibilities, the complexity of its personnel and the possibilities which exist for the future.

Although nearly 20,000 miles of airways are now in operation, it is particularly evident that the task of construction is not yet complete. There are many blank spaces in the system.

Technical problems in radio particularly, have already made checks, more covering aids. The new fog landing developments in radio mean not only the careful study of practical application, but a determination of policy regarding installation and use.

Intermediate landing fields spaced for 1500 flying equipment may not in many instances, adequately meet the requirements of 1000 equipment. Some may no longer be required, others may need improvement.

How to meet these changing conditions and anticipate the existing airways on a very much reduced budget is the task that I face. I expect to meet it successfully. In this expectation, I feel confident of the unqualified support of the entire personnel of the Airway Division.

At the earliest possible time I shall inspect the entire system and meet those directly charged with its successful operation. Such projects are being considered for future construction will be carefully studied with a view to their economic feasibility.

It should be obvious that with production being pushed to 20 hours per week, transportation must be geared higher. This means not only more, the airplane. No other means of transportation affords an equal. To achieve the best possible results, certain new projects appear necessary, as well as a modernization of existing aids and equipment.

Present appropriations do not provide any funds for new construction or the modernization of existing equipment. As a result, however, it being made to secure loans from the Public Works Administration for these purposes. Should we be successful in securing such funds, expenditures will be made partly on the basis of planned economy.

In conclusion permit me to say that I offer the aviation industry my sincere wish that the aviation industry will be able to do its share to cooperate fully in all matters that will advance the industry.

In return I ask a similar measure of co-operation by the industry with those who will be serving with me.

J. Carroll Coole

Director for Aeronautics Development

ACCOMPLISHMENTS standing to the credit of the Aeronautics Development Service of the Aeronautics Branch cover a wide range of activities related to flying. Some of them are accomplishments which will have a profound effect upon the future of air transportation, like the development of a radio system for blind landing of aircraft. Others are of a less spectacular nature, for many of its activities the Aeronautics Development Service works behind the scenes.

Research on aids to air navigation and safety problems relating to flying, dissemination of aeronautical information, publication of air navigation maps and instruction of airport development are the major phases of this service. All are vital to progress in the science and business of flying.

At the new Assistant Director for Aeronautics Development, I recognize that the industry has developed along lines which contemplate the need for phase changes as air carried out. Consequently, there will be no radical departure from previous policies. As in the past, the Aeronautics Development Service will endeavor to coordinate its activities with those of the industry.

However, another factor has to be

considered as plans for the immediate future—the reduced appropriations with which the Aeronautics Branch will have to work in the coming fiscal year. This difficulty, of course, is one which them all other agencies of the Federal Government. With respect to the Aeronautics Development Service, it means that some projects will have to be reduced in scope or temporarily laid aside. It may mean that some research work will be discontinued but important investigations in aeronautics will be continued. A shortage of funds for printing has necessitated changing the Air Commerce Bulletin from a semi-monthly to a monthly publication. Various concerning reports and reports formerly carried therein now appear in a weekly photographic bulletin bearing the title, "Weekly Notes to Aeronauts," which, incidentally, enables the Aeronautics Branch to make this important information available at more frequent intervals than in the past.

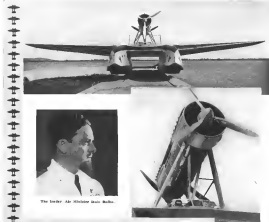
The activities of the Aeronautics Development Service have been important to the industry in the past, and they are far more so at this time, when the airlines, business and other aviation organizations connected with flying have just passed through a period of trying economic difficulties. The Aeronautics Development Service will endeavor, in its professional work, to play the same role during a period of economic recovery that it had first during a time of unbridled boom expansion, and later during a world-wide depression.

Improved Safety Belts

ONE of the most important with which passengers and operators have to contend is the safety belt. If the belt is too obvious or is too cumbersome, it is likely not only to cause annoyance, but to have a bad psychological effect. Since passengers vary greatly in overall dimensions, some form of quick adjustment mechanism must be provided, but the standard airplane type safety belt with its complex system of straps and buckles falls well of the mark for transport use.

Officers of Transcontinental and Western Air, Inc., have done some intensive work on the problem, and a new type of belt has been evolved under the supervision of W. A. Hamilton, superintendent of maintenance, which is now undergoing active service testing in one of TWA's ships. As indicated in the accompanying photograph, the loading arrangement is attached to the opposite side of the chair frame. The slings of nylon and vinyl straps pass the strap through the fastener, pull it down to the desired tension and release it. An automatic cam wedges the strap firmly in place so that it cannot be withdrawn. To release himself, the passenger merely pushes the plunger button on the left arm of the chair and then stands up.

The advantages of such a belt are obvious. There are no buckles to be fastened inadvertently or to be fastened with by untrained hands. The adjustment to the individual user is easy and automatic, and the release mechanism is quick, using no untrained hands. The removal of the seat is improved by the elimination of loose ends of straps and webbing.



The leader, Air Machine State Bank.



Headquarters of Italy's first, the RFLC. Above: Italian standard bomber group of the 1st. Below: an airplane in Rome, showing the name of the state of Italy.

Visitors from Italy

A peaceful invasion by Il Duce's squadrons



Lead planes for reconnaissance or light bombing. Above, I-15. Below, I-15bis. Both are equipped with 400 hp engines and 100 mm cannons. Below, I-15bis. Both are equipped with 400 hp engines and 100 mm cannons.

Below: Soviet I-15bis. The I-15bis is modified from the I-15. It is equipped with a 100 mm cannon. Below: Soviet I-15bis. The I-15bis is modified from the I-15. It is equipped with a 100 mm cannon.



United States. Above, left, I-15bis. Below, left, I-15bis. Both are equipped with 400 hp engines and 100 mm cannons. Below, left, I-15bis. Both are equipped with 400 hp engines and 100 mm cannons.



Two Soviet I-15bis. Above, left, an early type (I-15bis) with a 100 mm cannon. Below, right, an improved type (I-15bis) with a 100 mm cannon. Below, left, a Soviet I-15bis. The I-15bis is modified from the I-15. It is equipped with a 100 mm cannon.

Along with the vast program of industrialization in Russia is the equally important problem of providing adequate defenses for a territory of tremendous size. While it is common knowledge that much energy is being devoted to the rebuilding of the Soviet Air Forces, detailed information is extremely scarce and most of it is flavored with personal opinion or impressions gained in limited observation. We are particularly fortunate in having for the author of this article of our military series a man whose association with Russian aeronautics dates back to the early years of the Soviet Government and who is, taking an active part in its development at the present time.

The equipment of air forces

THE UNION OF SOVIET SOCIALIST REPUBLICS

By Arthur A. Adams

Chief of Division, United Aircraft Industries of the U.S.S.R.

AIRCRAFT played an important role in the activities of the Russian forces during the World War. The development of the armed air forces of the U.S.S.R. began in the year 1921. Prior to that time the armed air forces of the Soviet Union were largely composed of types of imported planes and some trophies captured from invading armies during the Civil War.

The types of planes developed in this country are classified as follows: B—Bombers; P—Fighters; L—Light Bombers; TB—Heavy Bombers; and T—Torpedo Bombers. The types of planes developed in this country are classified as follows: B—Bombers; P—Fighters; L—Light Bombers; TB—Heavy Bombers; and T—Torpedo Bombers.

Construction materials

Kobalt-steel, an aluminum alloy of the duralumin type, developed in the U.S.S.R. is one of the most widely used materials in aircraft construction. It differs from the conventional duralumin used elsewhere by the presence of small amounts of cobalt, which gives it the property of being able to be used in the form of a solid. The Russian design policy is to use only duralumin. Properly treated, Kobalt-steel provides higher anti-corrosion qualities. Its tensile strength is 96,000 lb. per sq. in. with an elongation of 14 per cent good machinability and it improves very simple processes for wing, etc.

Stainless-steel pipe—a material with a specific weight of 562 dynes/cm³—is used in aircraft of composite design where

wood is also employed, satisfactorily replacing the well known spruce used in American planes.

Welded fuselages are common. Chrome-nickel-steel and other steels including stainless, as well as magnesium alloys of the Duralumin type are used in their construction.

Reconnaissance lead planes

Planes of the B class are used for lead reconnaissance and for light bombing. They have either wheel or float landing gear which permits their use for land and sea reconnaissance. Such types are well known as scouting planes. Their steel characteristics are outlined in Table 1.

The B-5 plane with 450 hp, water-cooled I-15 engine, is a two-seater biplane used for lead reconnaissance or light bombing. It is an all-metal plane constructed mainly of Kobalt-steel, aluminum, and stainless steel.

All the flying devices and engine controls are concentrated in the lower cockpit. The left side of the fuselage carries a stationary machine gun, firing through the propeller and operated by the pilot.

The rear cockpit is for the observer. It also carries control stick, rudder pedals, engine control instruments, photographic installation, bomb release, turret with two joined machine guns and signaling devices (red-green) for the crew. The fuselage is made of steel and aluminum. The fuselage is made of steel and aluminum.

The fuselage is composed of upper and lower wings of an inverted profile

known as the "AST." Both upper and lower wings are rectangular with rounded tips. The tips and chord of the lower wing are smaller than those of the upper. The wings are braced externally with Y-shaped struts and diagonal wires. The upper wing alone has ailerons. The tail group consists of a stabilizer, balanced director and rudder. Horn type compression is used extensively. Corrugated aluminum covering is used for the fuselage, wings, stabilizers and rudder.

The landing gear is composed of two separate units, each with two struts, forming a triangular pattern with downward apex. The upper ends of the struts are braced into one point at the lower part of the fuselage. Aileron and struts are of steel tubing.

The B-5 plane, with 450-hp, water-cooled I-15 engine is a two-seater biplane.

This plane is equipped and armed for lead reconnaissance and light bombing against day and night targets.

The B-5 is built of metal and wood having a fuselage of rectangular cross-section with semi-circular convex upper and lower wings. The wings are rectangular in plan form with rounded elliptical tips. The upper wing has the larger area and is braced with diagonal struts. The lower wing is braced by a pair of H struts and wires.

All the carbons and the fuselage are fabric covered excepting the front part which is covered with Kobalt-steel. The landing gear is made with rubber shock absorbers on the forward struts.

Cockpits for the pilot and the observer are in tandem with the pilot's cockpit forward.

Reinforced ailerons are fitted on the upper wing only. Stabilizers and rudders are of the conventional type.

Table 1. Weights and sizes of reconnaissance planes

	DB-2 with M2 engine	DB-2 with M17 engine
Gross weight (lb.)	4,620	4,100
Weight empty (lb.)	2,100	1,810
Useful load (lb.)	2,520	2,290
Load (lb. per sq. ft.)	10.6	11.2
Load (lb. per sq. ft.)	10.6	11.2
Span (ft.)	40.7	36.9
Length (ft.)	25.3	24.8
Wing area (sq. ft.)	311	282
Wing load (lb./sq. ft.)	14.7	14.6
Top speed (mph)	300	340

Table 2. Performance of reconnaissance planes

	DB-2 with M2 engine	DB-2 with M17 engine
Maximum speed (mi. per hr.)	160	185
Maximum speed (1,000 ft.) (mi. per hr.)	127	145
Maximum speed (5,000 ft.) (mi. per hr.)	110	125
Altitude (ft.)	14,000	15,000
Range (mi.)	600	650

Bombers

High-engine planes classified "TB" comprise that group. The Soviet aviation industry has produced the following types of heavy bombers: TB-1 with two M2 engines, TB-2 with two M2 engines, TB-3 with two M2 engines.

The TB-1 is a two M2 engine reconnaissance plane. The TB-2 is a two M2 engine reconnaissance plane. The TB-3 is a two M2 engine reconnaissance plane.

The TB-1 is a two M2 engine reconnaissance plane. The TB-2 is a two M2 engine reconnaissance plane. The TB-3 is a two M2 engine reconnaissance plane.

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The TB-1 is a two M2 engine reconnaissance plane. The TB-2 is a two M2 engine reconnaissance plane. The TB-3 is a two M2 engine reconnaissance plane.

the sides of the central section of the fuselage. The control and rear observers each have a turret with two forward-mounted machine guns. Both forward turrets of the revolving type will swing to either side of the fuselage.

The wing consists of a center section integral with the fuselage and two detachable panels. Both front and rear sections of the fuselage are detachable and are hinged to the central part. Front and rear of the outer sections are attached to the fuselage by means of detachable installation of the fuel tanks, servicing, etc.

The leading gear has two separate sides. The long end of each member of the divided axle radiates upward and is hinged to the bottom of the fuselage. The short, horizontal end of each axle which carries the wheel is attached with the aid of cord shock absorbers to the supporting girder of the leading gear. The wheel is vertically in the plane of the corresponding engine. The upper ends of the struts are fastened at the lower wing surface.

Rudder and stabilizer are adjustable and of conventional type. Two lateral struts brace the stabilizer from underneath. Landing gear can be replaced with floats supported by a system of struts which may be attached to the legs provided at the lower surface of the center section.

The TB-4 type plane with TB-4 engine, modified for civilian flying is known to the American public in consequence of its Moscow-New York flight in 1935 as the "Soviet Scout" (Lent of the Soviet).

The TB-2 is a two M2 engine reconnaissance plane. The TB-3 is a two M2 engine reconnaissance plane. The TB-4 is a two M2 engine reconnaissance plane.

Table 3. Weights and sizes of bombing planes

	TB-1 with two M2 engines	TB-2 with two M2 engines	TB-3 with two M2 engines
Gross weight (lb.)	11,000	14,000	14,000
Weight empty (lb.)	5,500	4,100	4,100
Useful load (lb.)	5,500	4,100	4,100
Load (lb. per sq. ft.)	10.6	11.2	11.2
Load (lb. per sq. ft.)	10.6	11.2	11.2
Span (ft.)	40.7	36.9	36.9
Length (ft.)	25.3	24.8	24.8
Wing area (sq. ft.)	311	282	282
Wing load (lb./sq. ft.)	14.7	14.6	14.6

Table 4. Performance of bombing planes

	TB-1 with two M2 engines	TB-2 with two M2 engines	TB-3 with two M2 engines
Maximum speed (mi. per hr.)	160	185	185
Maximum speed (1,000 ft.) (mi. per hr.)	127	145	145
Maximum speed (5,000 ft.) (mi. per hr.)	110	125	125
Altitude (ft.)	14,000	15,000	15,000
Range (mi.)	600	650	650

Table 5. Weights and sizes of pursuit planes (Catalina model)

	DB-2 with M2 engine	DB-2 with M17 engine
Gross weight (lb.)	4,620	4,100
Weight empty (lb.)	2,100	1,810
Useful load (lb.)	2,520	2,290
Load (lb. per sq. ft.)	10.6	11.2
Load (lb. per sq. ft.)	10.6	11.2
Span (ft.)	40.7	36.9
Length (ft.)	25.3	24.8
Wing area (sq. ft.)	311	282
Wing load (lb./sq. ft.)	14.7	14.6

Table 6. Performance of single motor pursuit planes

	DB-2 with M2 engine	DB-2 with M17 engine
Maximum speed (mi. per hr.)	160	185
Maximum speed (1,000 ft.) (mi. per hr.)	127	145
Maximum speed (5,000 ft.) (mi. per hr.)	110	125
Altitude (ft.)	14,000	15,000
Range (mi.)	600	650

Table 7. Weights and sizes of two-motor pursuit planes

	DB-2 with two M2 engines	DB-2 with two M17 engines
Gross weight (lb.)	4,620	4,100
Weight empty (lb.)	2,100	1,810
Useful load (lb.)	2,520	2,290
Load (lb. per sq. ft.)	10.6	11.2
Load (lb. per sq. ft.)	10.6	11.2
Span (ft.)	40.7	36.9
Length (ft.)	25.3	24.8
Wing area (sq. ft.)	311	282
Wing load (lb./sq. ft.)	14.7	14.6

Table 8. Performance of two-motor pursuit planes

	DB-2 with two M2 engines	DB-2 with two M17 engines
Maximum speed (mi. per hr.)	160	185
Maximum speed (1,000 ft.) (mi. per hr.)	127	145
Maximum speed (5,000 ft.) (mi. per hr.)	110	125
Altitude (ft.)	14,000	15,000
Range (mi.)	600	650

the fuselage and the upper wing of wood. The TB-2 is a typical monoplane with its upper wing placed high above the fuselage and the engine placed on the lower wing only on either side of the fuselage.

The control wing bracing consists of two pairs of inclined struts. Two other pairs of struts connect the engine mounts to the upper portion of the fuselage and to the spars of the upper wing. Two machine guns to clear the rear anti-aircraft are installed on the lower wing at the rear of the engine nacelles. The front and rear of the fuselage have serviceable double machine guns. For better visibility in landing the lower front end of the fuselage is glazed. Landing gear, re-

dors and stabilizers are of conventional type.

Pursuit planes

Present planes classified as "P" comprise that group. Present planes with more than two engines known in the U.S.S.R. are used by the armed forces of the U.S.S.R. Information for publication on these planes is not available at the present time. The armed forces of the U.S.S.R. have experienced employment and are now experiencing the following types of pursuit planes: 1-TB, 2-TB, 3-TB, 4-TB, 5-TB, 6-TB, 7-TB, 8-TB, 9-TB, 10-TB, 11-TB, 12-TB, 13-TB, 14-TB, 15-TB, 16-TB, 17-TB, 18-TB, 19-TB, 20-TB, 21-TB, 22-TB, 23-TB, 24-TB, 25-TB, 26-TB, 27-TB, 28-TB, 29-TB, 30-TB, 31-TB, 32-TB, 33-TB, 34-TB, 35-TB, 36-TB, 37-TB, 38-TB, 39-TB, 40-TB, 41-TB, 42-TB, 43-TB, 44-TB, 45-TB, 46-TB, 47-TB, 48-TB, 49-TB, 50-TB, 51-TB, 52-TB, 53-TB, 54-TB, 55-TB, 56-TB, 57-TB, 58-TB, 59-TB, 60-TB, 61-TB, 62-TB, 63-TB, 64-TB, 65-TB, 66-TB, 67-TB, 68-TB, 69-TB, 70-TB, 71-TB, 72-TB, 73-TB, 74-TB, 75-TB, 76-TB, 77-TB, 78-TB, 79-TB, 80-TB, 81-TB, 82-TB, 83-TB, 84-TB, 85-TB, 86-TB, 87-TB, 88-TB, 89-TB, 90-TB, 91-TB, 92-TB, 93-TB, 94-TB, 95-TB, 96-TB, 97-TB, 98-TB, 99-TB, 100-TB, 101-TB, 102-TB, 103-TB, 104-TB, 105-TB, 106-TB, 107-TB, 108-TB, 109-TB, 110-TB, 111-TB, 112-TB, 113-TB, 114-TB, 115-TB, 116-TB, 117-TB, 118-TB, 119-TB, 120-TB, 121-TB, 122-TB, 123-TB, 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Apparatus for overhaul and test in maintenance magazine will handle equipment.

3,000 sq ft of floor area was taken over. The total personnel at the plant have increased to now 40 persons, including 19 men in the engine shop, 9 in the aircraft repair department, 3 in the propeller repair department, and others in stockroom, office, sales and consultation work. Present officers of the company are W. E. Thomas, president and general manager, Palmer Norblad, vice-president, in charge of sales.

Serving eight states

The territory served by the Pacific Aircraft Corporation, Ltd., includes roughly, the eight western states: California, Arizona, Nevada, Utah, Idaho, Montana, Washington, and Oregon. In addition to the headquarters at United Airport there are now two branch stations, equipped for service and supply, one at Los Angeles Airport and the other at the Oakland Airport. Hangar service and storage, and ground repair and supply service are available at all three places, although the majority of heavy overhauls is performed at the United Airport base. Besides these three stations there are five regional service and supply bases operating as parts and supply dealers under the Pacific Aircraft Corporation: San Diego Air Service, San Diego; Santa Maria Airline, Santa Maria; Northwest Air Service, Seattle; and Midwest Parts Airways, Grand, Missouri. A stock of parts is maintained at all of these points and general service is available. The total business done by the organization in 1950 approximated \$10,000,000. An increase of 10 per cent over this figure was shown for 1952.

The fullest co-operation has been given by all manufacturers concerned in the development of all services and facilities. Equipment has been installed that

enabled fully with factory requirements and factory have been replaced, or have been obtained through only to give 7.5 employees training in -purchased methods.

Equipment

The plant equipment includes a complete engine cleaning plant for engine parts, a sandblasting machine, an automatic lathe used for assembled parts, an

vertical lathe for tank for tempering metal parts, a 60-ton hydraulic press for stamping propellers, propeller shoring tools, complete propeller grinding and polishing equipment, and a machine shop that is completely equipped with everything needed for engine overhaul. An example of certain highly specialized equipment is found in a factory developed in the Washburn plant for bearing center and test more bearings of Wright Whetstones which proved to be successful than the Wright Aircraft Corporation then adopted it as a standard tool and has listed it as their tool catalog. Other special equipment in the engine shop includes a crankshaft test developed in the local shop for all Pratt & Whitney and Wright Whetstone engines, a Washburn Universal Connecting Rod Boring Fixture capable of boring master and articulating rods for all radial or vee type aircraft engines in an assembly of 0.0001 in., a Rockwell hardness tester, and a press for machine handle pins in the end assembly of Pratt & Whitney engines.

Among the tools for assembly repair there is equipment for testing carburetors and electrical apparatus. A special machine for testing propellers is used in the wheel and blade department. Recently a shop shop has been added—3,000 sq ft of space in a detached hangar building, equipped with air conditioning apparatus which maintains a constant room temperature of 70 deg. and changes the air every three minutes.



Air brakes on the Beechcraft

IN DISCUSSING Walter Beech's latest airplane (Airsports, December, 1952), mention was made of the split rudder used to increase parasite drag in order to make slow landings at deep angles. The accompanying photograph shows the rudder in the open position, and indicates how normal directional control can be maintained

even with the flaps open because of the double-angled mounting. The picture reveals also a number of interesting strengthening details, particularly the method of fitting the hinge wires into the fuselage and the method of padding the fuselage against fire danger. Note also the high speed wire of the tail rotor and the arrow elevator chord

AVIATION
August, 1951

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August, 1951

The brake pedal problem

A few principles for foot pedals that may aid in standardizing their design

By Alfred H. Hofer

Pasady Manufacturing Company

THIS application of brakes and brake pedals has been the cause of numerous fatalities in airplane maintenance and to designer of wheels and brake shoes. As a matter of fact, airplane brakes are simple enough. They may be installed readily and operated efficiently when fitted properly into the design. Unfortunately, most men simply come to a lack of understanding, because of the manufacturer and the user.

Most of the trouble centers around the design of the foot pedal. It happens that the particular design tends to act readily to malfunctioning, for, after all, the amount of pressure which a pilot can exert with his foot is almost a fixed figure. To lay down a few principles for pedal design may serve to reduce the correspondence anomaly between the airplane and the brake manufacturer.

Perhaps a brief history of the development of brakes might serve as a point of departure for the discussion. Since as it was, and the airplane is easily responsible for the airplane manufacturer, the history of the design and application of the brake brakes at McCook Field, a plane was taken, parachute, and the pilot space all leading down, discharging to a proper aircraft and designing them. At every landing the long roll would maintain race which might have been spent in turning back for another land. Somebody would be looking at the writer was given the job of designing and building the first set, largely because he designed brakes for substitution planes before the War. In some early brake arrangements the pedals were independent of the rudder bar. The McCook idea was to combine the rudder bar and the brake pedal.

The first pedal was applied directly to rudder bar and was actuated by the foot. This method was not long in use because it was almost impossible to apply the brake with the foot which was facing forward, as the foot tended to slip off the pedals and the pilot would have to turn the pedals down. Flanges helped the slipping somewhat but the arrangement was never used

at first. In building the first set it was found that many of the difficulties of the straight type could be overcome by turning the pedal. Then, the top edge of the pedal became another foot rest, actuating the brake and steering at the same time. The pilot did not have to reach so far forward with his foot.

The McCook Field experiment soon found the straight type of pedal to be the best. The center forward and back in the same place helped the tendency of the foot to slip off to one side, and it was almost as easy to apply force in the far forward position as in any other. Another advantage of the straight type is that it occupies less space in a cramped cockpit. It may be compared easily under an instrument board, and is compact, saving both vertical and horizontal space. When lined properly, it is possible to apply either brake at full force without requiring much pressure on the opposite rudder. This may not seem important, but brakes are needed at times of stress, when the pilot is very busy, and the difficulty can be removed from his consciousness by the designer will pay dividends in safety.

Tie or heel

The question now rose, however, as to whether the toe or the heel should be used in applying the brake. The toe method was the favorite, because greater movement is possible, and the motion seemed easier. To general, the toe pedal is best in the way of plane operation when the brake is not in use. To get the heel pedal out of the pilot's way, it is satisfactory to place it on one side or in the center of the strap. In such a position it may frequently be moved away to combine the rudder bar and the brake pedal.

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larger brakes. Then, the trend of the pedal in the cockpit must be 3 to 6 in. as it is difficult to get that much travel when the pedal is half-extended. It has been found that 6 in. is the maximum for comfortable use.

As to the lever, required, the Army originally set a maximum of 390 lb. pressure on the lever at the brake. It was estimated at that time that the average man could exert 200 lb. on the brake pedal with his foot. This was much more force than is needed in most cases, but it was a convenient maximum figure for use by manufacturers of brakes.

Braking power

Since the coefficient of friction of a tire on the ground is about 30 per cent, each brake would be required to hold a load (tangent to the tire) of 25 per cent of the weight of the airplane. Thus, for a plane weighing 3,000 lb., equipped with a set of 8x16s which, each brake would be required to hold 750 lb., tangent to the tire. A force of 450 lb. on the brake lever will hold this load, and with a brake pedal rate of 3 lb., the force required of the pilot to brake the tires on the ground would be 150 lb. Since the thrust of the propeller, with engine wide open, is only 4 lb. per horsepower, it requires but a small part of the braking power (about a third of the maximum on the average) to hold the plane when running on the engine. The normal force on brakes were static force. At the present time, Wright Field is testing also by means of a dynamometer. The wheels are driven from 30 to 50 mph by large electric motors and varying loads (from 20 lb. to 250 lb.) applied to the brake lever to vary slowly the amount of braking. This maximum load now applied to brake levers is 250 lb.

The above figures are for military planes. Although military aircraft need not adopt military standards, their requirements are excellent guides for the civilian designer. For smaller ships that require much less braking power, less design may be made from military standards.

E D I T O R I A L S



EDWARD P. WARNER, Editor

Not so quiet along the Potomac:

EVERY AIRSHIP is entitled to a shake-down cruise, and every airplane to a series of test flights, before its performance is formally judged. The administration in Washington has now passed through the shake-down period. Its purposes are defined. Its courses are set. They will be changed from time to time, but the general policies which President Roosevelt and his co-workers seek to promote and the sort of a country which they seek to make, are now reasonably clearly apparent.

Furthermore, we have entered the new fiscal year, the first in which the planning of the new administration could have any pronounced effect. No sooner were the new forces in power in Washington than they began to shape their plans for a re-arrangement of the Government's spending, and a reorganization of the departments that do the spending, immediately after July 1. We have reached that date, and the results of the planning have begun to be apparent. Now, for the first time, it is fair to appraise the effect of Democracy's return to power upon American aviation.

Five months ago, in our Record-of-Progress issue, we addressed to the new President and his associates and to the new Congress a general prescription and an appeal. The prescription was of the present state of American aviation and of the spectacular progress that it had made over the past few years. The appeal was for fair governmental treatment of the aeromedical industry and of the operators of aircraft, in order that the ground that had been so brilliantly gained might not be lost. Five months have passed, and now we can see what has happened.

When we look along the air line, and into the air craft factories there is plenty of reason for encouragement. The record of progress that was needed last March has been paid higher and higher with new achievements since that time. New planes and new aeroplanes have made air transport more comfortable, more safe, more swift, more reliable, and more popular. Records for intricate speed have been broken repeatedly, and records for passenger and express mail have been broken by even larger margins. But when we turn away from current operations and look

to the capital of the nation there is less occasion to be cheerful.

WIFE DISCOVERY with distress and with alarm that the drive for economy has taken more deeply into aviation than into almost any other major governmental activity. Aviation has been growing, and growing rapidly. There has been every reason to expect its proportionate share of the attention of the American people would continue to increase. Yet the government's attention to aviation, as indicated by appropriations, has not merely stopped increasing and begun to decrease, but is decreasing much more rapidly than for other comparable activities.

Let us take an example. The Aeronautics Branch is charged with the construction and maintenance of airways, and with the regulation of American commercial flying and aircraft construction. Two years ago the total appropriation was \$10,850,000 for the year. For the present fiscal year Congress appropriated \$7,600,000, and now the Secretary of Commerce by administrative decision has determined that only 68 per cent of that amount, or \$5,172,800, will be expended. Inevitably that means drastic reduction in airway service, in research, in mapping work. The officials of the Department of Commerce will give us everything that they can. They will stretch every dollar to the limit, but there is no known trick by which five million dollars can be made to do the work of eight or ten.

WIFE DO we for a moment suggest that aviation should be anxious for sharing in the sacrifices that the interests of government economy and the plan for economic recovery demand to every quarter. We want take our share of the general pinchment, and believe that we shall gain back all that we have lost and much more besides in commercial sales and commercial revenues as recovery progresses, but we do make exception to making sacrifices far beyond the general run. Let us, for example, compare the figures just given for the fate of the Aeronautics Branch with corresponding figures for the services that the Department of Commerce renders to the merchant seaman.

Take the Bureau of Lighthouses. The all-time high for lighthouse construction and maintenance up to a year ago was \$3,944,000, only 6 per cent above the highest figure for aviation. The last cut that has just been made by the Secretary of Commerce still allows

\$8,672,000 for lighthouse work, or almost 70 per cent more than aeroplanes is to receive. Furthermore, that sum is to be supplemented by a special allotment under the new public works administration of \$3,334,000 for lighthouses, while aeroplanes receives only the almost trivial sum of \$443,000 from the same source. To the regulation of aircraft corresponds the steamboat inspection service. Before the depression the bureau of navigation and of steamboat inspection were spending about \$1,500,000 a year. For the present fiscal year they are being allowed \$1,570,000, a cut of only 25 per cent from the high, while aeroplanes is taking a cut of just 50 per cent. Such illustrations could be multiplied.

THAT is but one of several reasons for feeling alarm. There is another in the air mail service, where the appropriation for domestic air mail has been cut by Congress from approximately \$30,000,000 in each of the last two years to \$15,000,000 this year. We believe more fairly than at any time in the past that American air transport is making steady and rapid progress towards a self-supporting basis, and that it will soon self support within a very few years but we cannot suggest the bad effects of arbitrary cuts which will lower reductions of service just as the airlines are really giving a proper grip upon the faces of the traveling public. A 25 per cent cut is bad enough, but that is now written into the law. The ground that has been lost may be regained by deficiency appropriation at the next session of Congress, and in the meantime the loss will not be absolutely final. If the reduced appropriation is wisely distributed and wisely administered. Unfortunately, however, there are persistent reports that the director of the budget is dissatisfied with the saving that has been made, and that he entertains plans for another 25 per cent cut on top of the one already imposed. We are not judging the situation too harshly in estimating that anything of that sort would mean a very substantial postponement of the day when air transport will be able to stand on its own feet so that direct government backing of any kind. The American people have become used to this service and they have no intention of giving it up, but it must be meted through the transition now from a subsidized to an independent condition. Too hasty a treatment will do, even from the point of view of economy.

In the sphere of military aviation there are no such definite figures on the new year's allowance as have been furnished by the Department of Commerce, but such information as exists is far from encouraging. The abolition of the assistant secretarieships for aeronautics was a discouraging warning of a decreased regard for aviation in military and naval planning. The more or less humorous statements reported from the offices in the War Department to the effect that "we may buy an airplane now and then,"* and the

constant emphasis on the superiority of ship construction in the Navy Department, have been additional warnings. No one knows definitely just how much of their appropriations for the current year the War and Navy Departments plan actually to spend on the purchase of aircraft, but it seems clear that they plan for less than the law allows them. From the public works funds comes \$238,000,000 for surface vessels for the Navy, with only \$5,000,000 to be allowed for naval aircraft. Aviation gets but 4 per cent of the amount that is to go to ship construction. The aircraft industry has been making heroic efforts to carry on in spite of declining military orders, and to make up for difficulties at home by an increased effort in the export field, but there, too, a serious blow has been suffered in the virtual dismantling of the aeronautics trade delegation of the Department of Commerce. Its chief and its assistant chief are both out of the service of the government. Its special aeronautics trade commissioners in the field have been summarily called home, and the aircraft industry will have to reorganize its export plans to get along without the assistance help that has hitherto been received from Washington.

Put it all together, and it makes for the most a somewhat gloomy picture. If we do not believe that the phone is going to continue, it is because we have full confidence in the far-sightedness of the administration and its desire to serve the public interest. We are confident that the public interest demands the continued support of our rapidly progressing air transport, and a reasonable expenditure for the continued development of military aviation. We are confident that the American people will make their voices heard, and that administrative policy will be subject to change, if we make it really clear what aviation is getting.

Now we are on the point of going to press. From the Secretary of War we have some encouraging and promising observations. "The construction of aircraft, by enabling the Army to complete its defense program, would give to a great extent a highly specialized service in an industry that is small and that has been receiving a fixed time to some extent."

Bigger and better!

PERHAPS the function of an editorial should be limited to interpretation, counsel, criticism, and caution. Perhaps space so close three pages should be considered as too precious for any other use, but we just can't stick to any such rule as that. Every now and then we are unable to restrain ourselves from a note of simple exhortation, and an editorial has to be written which has no possible object except to point with pride.

Recently they started an exposition in Chicago. They started it duly scientific fashion, with the help of a beam of light that had built Aeronauts 40 years ago and been on the way ever since. The light that was destined to show the switch had already made a full

two-thirds of its journey before the first regular *Avianca* can air mail service was started. But on the day that it finally fledged into Chicago, over 300 banana visitors also arrived in that city—by air.

Expositions do American aviation a great service. The first biplane passenger service in the United States was started by private Philadelphia to carry visitors to the Sesquiannual of 1926. In 1933 the Century of Progress is bringing to Chicago by air people who never before gave the slightest thought to the possibility of flying, and every week brings a new quota of sensational traffic records as a result. In the January issue at *AVIATION* the editor forecast a passenger mileage on American air routes of 175,000,000 for the present year, an increase of more than 30 per cent over 1932. After a slow start in the first four months, it looks as though that prophecy might be exceeded by a comfortable margin.

Many Americans who have never thought of flying at all have in the past been converted to air travel by European experience. There is something about the healthy sense of the tourist that makes him willing to try a new form of transportation which he might never have thought of using in connection with his business. For that purpose, the Chicago exposition is replacing Europe. Fortunately this special spur to passenger sympathies with the appearance on many routes of new planes setting a new standard in beauty, speed, and flying qualities. The greatest tribute that can be paid to American air lines now is an expression of our confidence that they give so good, so efficient, and so comfortable a service that we can rely upon it that most of the travelers to and from the Fair who make use of the airplane even once on their trip can be regarded as converts who will fly at every opportunity in future. Air transport is taking, during the present season, an ever longer step toward the center that leads to solid establishment as a major part of the American transportation system.

The Roman legions

fly westward

OUTSTANDING characteristics of fiction under Maschall have been daring and daring. That is proposed is bold as enough to command it to the Italian division, and in Italy Balbo the leader has a follower who hurly hurly across him. The mass flight around the Mediterranean four years ago seemed a colossal undertaking. The flight to Hawaii was even more spectacular. Both appear insignificant in the shadow that is cast by the voyage of 23 Savoia-Marchetti boats across the North Atlantic.

We have had plenty of chances to get used to the remarkable reliability of modern aircraft engines and flying equipment in the past few years. We have

studied the point where we need never expect a failure, and where it is a occasion for amazement if it occurs. Nevertheless it is still possible for even the most hard-core observer of aeronautical development to draw a triple up and down his spine from the performance of 24 twin-engined boats, heavily loaded and fully manned, which fly from Western Europe by way of arctic seas to Chicago without damage to a ship and without the faltering of a single unit in the line.

To General Balbo and General Pelligatti and the 300 men who make up the expedition, all possible expressions of admiration and praise are due. To the more nearly anonymous designers and builders of Savoia-Marchetti planes and of Savoia-Franchini engines there goes the glowing knowledge of the airplane of their peers abroad—the men who know by first-hand experience the problems involved in developing equipment that will stand the test of such a flight. At the moment when these lines are written, the squadron is in rest in New York harbor. Withdrawing them all possible credit in the eastern passage which they talk of making by more direct routes and so longer hops, we can extend to higher compliments than to say that we believe that they will get away with it and that the Italian air force will retain able and intact to us own shores.

IT IS not easy, but an honest desire to learn from the experience and the pioneering virtues of others, that makes us draw a lesson for American consumption from every performance as notable as this—in the present case we express again, as on various occasions in the past, our profound regret that American air forces have not in the last few years so little long-distance overseas squadron operation of a genuinely testing nature. The strategic problems of the United States lie largely in the Pacific. We renew the suggestion, already made in these pages, that the Navy Department should undertake further delay permit its plans for a vigilance flight by American flying boats around the Pacific from our Pacific Coast to Honolulu, through the islands of the Southwestern Pacific to Australia and the Philippines and perhaps a courtesy call to Japan, if the authorities there desire it, and then back by the inland route to Hawaii. As a test of equipment and of personnel, and as a demonstration of the quality of our forces, such a flight would be well worth while. It would be so well worth while that it seems to us almost obvious that it should be made if it can be. A few months ago there might have been doubt on that score, but there is no longer by any question about the possibility of making a cross-Pacific flight within the next couple of years. To question it would be to admit the inferiority of our own equipment and our own ingenuity to those of the Italian Regia Aeronautica. There is no occasion for any such admission, and we do not believe that the Navy Department wants to put itself in the position of making it.

STATISTICS OF THE MONTH

Supplementing the statistical work of *AVIATION*, March, 1933. Page numbers refer to that issue.

PRODUCTION AND SHIPPING

(Page 31)

Yale Shipyard and Identification

July 2, 1933

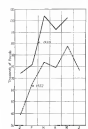
Unsettled	0.010
Unsettled	0.011
Plot (average)	30.000
Model (average)	1.000

ALBANY REPORTS, as indicated by the reports of income and identification issued for the first time, having started the year in an important financial position, by June had more than equalled the record of its predecessor. Completion of new transports for several of the major air lines has played a part. Reports from the factories indicate a steady and rapid rise in the production of transports during July should go well over a hundred engines produced, and so should August. The curves on the accompanying chart are based on fact and a third would be such a small and include only the production of regular transports, excluding the home builders and the makers of purely experimental aircraft.

FOREIGN TRADE

(Page 31)

RECENTLY all levels except the fixed total at 1932 principally, reports of shipments, exports and imports during the first five months of 1933 totaled \$2,746,410. Sales of airplanes showed very largely responsible for this in-



Planes shipped as identified for the first time, by month.

crease of some 140 per cent over total aircraft exports of the same period of the previous year. They amounted to \$2,142,761, for 177 planes, more than four times the number 1932 figures. Imports of \$2 and 40 per cent, respectively, in reports of engines and accessories were relatively unimportant. Imports also reached \$21,597, accessories \$14,462.

By far the last customer of American aeronautical commodities so far this year is Brazil, which accounted for



Planes shipped as identified for the first time, by month.

more than a quarter of the total foreign sales, \$1,024,000 worth. China, next in line, purchased barely half that amount. Like the two leaders, Colombia, a poor third, spent most of its funds on completed aircraft. Russia, Netherlands and Germany, next on the list, ranked first, second, and third as buyers of American engines, which are strong sellers in the transport boats of China, Italy, U.S.M., and Deutsche Luft Hansa. Japan headed the list of accessory purchases in the early months of this year, as it did last.

NEW TRANSPORT

(Page 31)

Scheduled Operations

First Five Months 1933

Other lines	18,000,000
Passenger miles	45,000,000
Export (total) (U.S.)	800,000
Net (total) (U.S.)	2,500,000



Financial status of scheduled air transport operations. Left: Air exports. Center: Revenue trade. Right: Air mail.

FHC-2 are destined for the High Altitude Squadron at the Naval Ordnance Base, North Island, San Diego, Calif. The contract amounts to \$308,000.

Automated public works

As the Federal Emergency Administration of Public Works got under way on July 14 with allocation of \$715,353,610 from the fund for projects throughout the country, action was almost neglected. Allotments to all branches of the industry amounted to \$729,000. The Bureau of Automobiles of the Department of Commerce got \$44,000 for rebuilding and improving houses, and radio facilities along the highways (on which other sectors must be turned off to keep within the bounds set by budget priorities). The Alaska Road and Airfields and the National Advisory Committee for Aeronautics \$200,000 for

the Aeronautical Chamber of Commerce at the meeting of its board of governors on June 20 got under way as the trade association, representing the aviation industry under the provisions of the Industrial Recovery Act. The meeting elected LeRoy Rogers executive vice-president in charge of all activities of the chamber and authorized the appointment of two committees, one to assemble the industry's views in a code, and the other to recognize the chamber for its work as instrument of the industry. It was later decided that the board of governors must itself act as the code committee. All elements of the industry, manufacturers, transport operators, commercial operators, airports and secondary and fuel services are being reached by correspondence and personal contact before the formulation of the code, to be drafted late in July. At the meeting Consolidated Aircraft Cor-

poration and the Douglas Company announced their intention of becoming members, making the Chamber a representative of the aviation industry as well as complete. Major H. H. Frost of the Consolidated company was elected a governor.

Bulletin No. 7-A reduces

To keep pace with advances in aeronautical information and eliminate many of the arbitrary and detailed design requirements now contained in it, the Department of Commerce is planning to make extensive changes in the Aeronautical Requirements of Air Commerce Regulations for Aircraft. Aeronautics Bulletin No. 7-A, a new law with aircraft manufacturers, originally issued for July 29, has been postponed for about a month to allow time for perfecting the proposed changes. The revised bulletin will probably contain only the essential single specifications. Color and illustrations, design data, and recommendations are to be published separately under one or each line as Recommended Practices and General Design Information. Maps showing wind direction and velocity in the upper air at various levels up to 10,000 ft. and in more cases higher, available twice daily at the airports (transmitted in the Federal Airways System) are another service to pilots recently added by the Aeronautics Branch.

Ironclad gun race

Another addition in the body of legal precedent permitting the treatment of gunpowder by airlines was made recently in the federal courts of Louisiana

AVIATION August, 1932

AVIATION August, 1932

The claim of American Airways to the special 5-cent zone rate was denied by the three-judge court composed of U. S. Circuit Judge Rufus E. Peckham and Federal Judges Wayne C. Booth and Ben C. Mason. Though the gasoline had been purchased outside the state and merely stored at Blueport, the court in ruling the company's plan of loading fuel in Louisiana was considered taxable, and not in violation of interstate commerce. A similar decision was handed down by a Wisconsin Federal District Court a few months ago. (AVIATION, June).

The U. S. Circuit Court of Appeals has sustained the decision of a lower court (AVIATION, April, 1932) denying the claim of Robert Emmet Ryan against the Chicago Youth Corporation for reimbursement of his stock control interests in and out of American courts since 1924. A Court of Claims case involving military claims was denied the right, in still pending.

Air race winners

Following a tradition of several years standing, the Bendix Trophy Race which opened the 1932 National Air Races at a new record. Col. Robert Tamm, aside the 2,580 miles from Floyd Bennett Field to Municipal Airport, Los Angeles, in eleven hours 30 minutes some 55 minutes better than the previous record set by him last November. The record for the flight in the opposite direction made by James Wedell in his private biplane, was in time and class identical. (Left: James Wedell, designer of the Waipac-powered World-Wildcat race which Colonel Turner flew to victory, followed hard on his heels to second place in no elapsed time of eleven hours 58 minutes. The other four contestants failed to finish in the elapsed time.)

Wedell also gave Turner his major competitors in the Thompson Trophy Race, speed classic of the race meeting, and carried away the first prize when Turner was disqualified for failing to bring a piston on the first lap of the 100-mile event. He made 261.69 m.p.h. on the first lap, 261.69 m.p.h. on the second lap in an effort to equal his own, but was eliminated by failure of the cockpit container.

Prize number three of two new classes, identical with Turner's except that it carried only a Waipac Jr., Wedell averaged 230 m.p.h. To a third Wedell-Wildcat race, held for four years, won, Waipac Jr.-powered and flown by Lee Gehlbach, took second place. Ray Maizee flew the Hawkeye Special, with Kenneth D. G. in the third place, and in third place, followed by George

Hague in a Hispano-powered Keith Roper and Z. D. Grouse in one of his stock model airplanes. The Gene Lee Roper, one of which holds the world's endurance speed record, was expected to offer real competition in the World-Wildcat event were both damaged in landings en route to the coast at the Bendix race. At the entrance in the Thompson event will appear before the N.A.A. contest continues on Aug. 9 in hearings at the race grounds, as expected by Colonel Turner.

In the 250 m.p.h. class Benny Howard's Hispano-powered plane was given its first place in last one of five events by Ray Maizee, but always driven by Ray Maizee in last Keith-Roper owned by Hispano engine. Lee Maizee took most of the victories in the 275 m.p.h. group, flying the Hispano-powered 244m & Arrow Special, with George Hague as the smaller Keith-Roper usually only a few yards behind. The race usually closed a profit this year, some \$1,000, for the first time since 1928 when a two-day event was held at Chicago.

At the American Air Races in Chicago, John Livingston and Art Horn both flying Waipac-powered Coast planes, especially built for the race, carried off most of the laurels. Livingston's plane was clocked at 237 m.p.h. in a straightaway race.

British air events

Victory in the King's Cup Race held at Harefield Aerodrome near London on July 8 went by a scant 26.3 to Captain Geoffrey de Havilland, a competitor in the annual classic since 1926. The Dewey Hispano-powered Leeward Mule, his own design, finished the last lap of an 800-mile race just ahead of the Cooper Swift with Philip, flown by Flight Lieut. E. C. T. Edwards. The 1932 air race, over 200 miles or less, each practically an endurance contest for the final round which stretched only eight of the 35 planes involved was a decided change from previous practice. King's Cup races in the past were flown in a largely one-way race over most of England.

Speedy air race, previously brought extra interest to the event by the fact that the race was held on the first lap of the 100-mile event. He made 261.69 m.p.h. on the first lap, 261.69 m.p.h. on the second lap in an effort to equal his own, but was eliminated by failure of the cockpit container. Prize number three of two new classes, identical with Turner's except that it carried only a Waipac Jr., Wedell averaged 230 m.p.h. To a third Wedell-Wildcat race, held for four years, won, Waipac Jr.-powered and flown by Lee Gehlbach, took second place. Ray Maizee flew the Hawkeye Special, with Kenneth D. G. in the third place, and in third place, followed by George



DEPUTY

Indicates that president of McDonnell Engineering Company, president of AVIATION, has been made Deputy Administrator of the National Defense Air Corps Act.

Westland Wapiti with 350-hp. Bristol Pioneers, and Hawker biplane powered with the Rolls-Royce Condor II which develops 400-hp. in its modified biplane form.

To distinguish aircraft built in Great Britain and installed as aeroplanes under the Air Registration Order of 1921, a British Aircraft Mark has been established. Application of the mark, which consists of a line running in gold within three circles of red, white, and blue, with the words "British Aircraft Corporation" in the white ring, is authorized by the Secretary of State for Air.

General aviation grows

Last chapter in the history of the North American Aviation-General Aviation Manufacturing Treaty is the consolidation of the W.J. Aircraft Corporation, a North American subsidiary since 1928. In manufacturing activities, concentrated in military planes, will be combined with those of General Aviation which is at present occupied with the production of lighted transports for Japan and Switzerland as well as for the American Army. Builders of the ST-15, first two-seater fighter to be used by the Army Air Corps, the 3-1/2 people are now working on both single and two-seater observation



experimental work and equipment at Langley Field. In the allocation of Department of Commerce funds the Aeronautics Branch also has come out on the short end. It will be allowed \$5,172,500, barely two-fifths the amount appropriated for it by Congress.

Though the development of aircraft as auxiliary first weapons to the fullest extent is included in the "second round" naval program of Secretary Denham, and the construction of airplanes to bring the Army Air Corps equipment up to the standards of the five-year program of 1928 is urged by Secretary of War Denham as part of the public works program, as yet no concrete have been forthcoming.

Aviation's code for the NRE

Adopting the organization plan previously ordered by its President Thomas A. Morgan (AVIATION, July).



TWENTIETH CENTURY TRANSPORTATION

Domestic history of the American Airlines exhibit at the Century of Progress Exposition is a true tale of the growth of civil aviation in the United States. It is shown. Below: United States Airlines exhibits its flying equipment. NRE as 1928, with its own aircraft, and its own flying equipment.

planes. Temple N. Joyce, an engineer at Burbank Joyce Aircraft, B/J predecessor, will become executive vice-president and general manager of General Aircraft. F. S. Hubbard, also of the B/J company, is to be its assistant. J. M. Schomaker, Jr., continues as president.

Consolidated goes west

Consolidated has been started at Lindbergh Field, San Diego, as a new place for Consolidated Aircraft Corporation. Its Consolidator flying boats, Pioneer transports, lighter fleet airplanes, and various military types are now made in Buffalo.

Increasing due to the Department of Commerce rules issued and other flying aids is responsible for the jump in the sale of aircraft parts. According to Westport Manufacturing Company of Glenview, Ill., more than 25 a month. Originally used exclusively in bombers, aircraft had the institutions are now being made in privately owned plants.

Personnel

Philip G. Johnson, president of United Air Lines, was recently elected president of United Aircraft & Transport Corporation to direct the manufacturing as well as the operating activities of the parent company. He succeeds Frederick R. Busschardt who becomes vice-president of the board, a new office just created by the directors.

Recent orders have brought back from an duty to service at the Bureau of Aeronautics. Colonel Robert B. Pasanah, Lt. Colonel Donald B. Davis, Lt. Colonel John J. Dufour and Lt. Colonel James H. Dyer, Jr., are being sent to the Navy. Colonel John H. Turner who was chief of staff and commander of aircraft of the Pacific Force, has been ordered to the Naval War College at Newport, R. I., as instructor.

Lt. Colonel Charles P. Mason of the USS Langley has been made executive officer at the Naval Air Station at Norfolk, Va.

Major Jack Berry has returned to Cleveland as manager of the Cleveland Airport. Major Berry held this position from 1946 and each time was when he transferred his recognition.

Benjamin Rosenbaum who with John Pohlman in 1931 New semi-top from New York to Istanbul to set a distance record which stood until a few months ago died on July 2 at a private hospital in New York. He was 47 years old. He was a pilot and a pilot at Indianapolis Municipal Airport in the take-off as a top in the Lincoln Trophy Race.

SIDE SLIPS

By Robert R. Osborn

MY S.F.P. of New York writes: "I think he is not getting on in aviation, probably in the South Sea, in search of some lower aspect ratio than airplanes. Apparently he is, since along that line came from the flying which he considered—least, the technical description in another aeronautical magazine of an aircraft surprise recently dropped. We spoke from the clipping. 'An expert says the lowest ever discovered in aviation is one to one point



seven (1.27), both an achievement in itself by airplanes, as a major development in airplane design."

This reminds me of a similar happening which we reported in this column a few years ago. An aeronautical engineer, apparently not of a very varied taste in new military designs, had conceived a manufacturer of paper boats that he should become a manufacturer of airplanes. The manufacturer accordingly set out to sell the new design to Navy officials at Washington. In the course of his sales campaign—meeting the various officials—he was going over the characteristics sheet and finally came to the official for the wings. "Look at that!" he said. "Distorted! I depress that! That's the best I can do and never get into an airplane."

We note that among the new airplane improvement devices designed for automatic flying of airplanes is an altimeter which sends a stream of cold water in the pilot's face in case he has taken a jump and the airplane has dropped to a low low altitude. At the height of the aviation boom, when student aviation were working Eastern hours, a few finger-without-doubt that he could not in plenty of sleep in the course of his flying. He didn't need any automatic altimeters to water him in as he claimed, he always woke up during the first landing, when his stomach made a bad landing.

A news item from the Los Angeles Times tells about the development of a new type of airplane propelling device, called a gyropropeller. "One of the ac-

cidents or the inventor is quoted as predicting: "The gyropropeller should revolutionize aviation and herald a new era in world wide transportation. In the present airplane has made it possible to travel in Los Angeles and there in New York, gyropropeller should be possible in short or long."

As all engineers make statements of this kind all previous to announcements to be due to the inevitable discovery of inventions to show us far away from home as possible.

Instead of the usual line, The Integrated (Aviation) perfecting up a handful of our experts to be passed through our office for the weekly ring, saying that he himself does not know much about the flying which he tells on the desk in explanation, stated that "one of the highest requirements dropped from an airplane in 1900's, altitude as it had to become merely there, a new feature as the greatest achievement of the aviation."

In a recent magazine interview on air plane flying business said that from his observations, now few men go to get from one place to another as quickly as possible and spend very little time looking out of the windows. On the contrary, women seemed to fly for the pure love of flying and were constantly delighted with the scenery below.

He has not said this particular flying business, but if he will read in his



photograph, we may be able to reach other conclusions why the new pilot will be looking out of the windows.

In her analysis of types of passengers we were surprised that the flying men referred to above did not mention the very serious type of passenger—the one who trips the arm of his chair as the plane is pulled off the ground who looks his finger and looks all around very worriedly when the ship is passing through patches of fog, and who finally jumps out of his seat when the plane is stalled down for a landing. That very unaccountable person is the pilot who has to make a trip along the line with neither pilot at the controls.

FLYING EQUIPMENT

Two Junkers transport planes

SUCCESSFUL operation of the six-engine Junkers G-38 by the German Air Force throughout the summer of 1951 on the Berlin-London route, has encouraged the construction of a new and modified of the same general type involving certain changes in passenger carrying accommodations. It is a derivative of the Junkers jet air of the wing, additional cabin room has been made available so that the new machine will seat 34 passengers instead of 25 in order to get the maximum utilization of the forward section of the cabin.

Since the G-38 class, have had at least one outstanding design feature in common. From stern to stern and from wing tip to wing tip, the skin surface has invariably been of corrugated sheet metal. Thus the Ju 60, a high speed single-engine transport with smooth skin fuselage and wing stubs, represents a real departure for Junkers designers.

The skin of the Ju 60 model has already gone into service on Lark House, and a second is under way for delivery by the end of the year. The ship has been designed to replace the Ju 53 or Ju 53-34 models. Powered with a 3070 Horse 225-hp radial engine, would seem to show a rapid speed of approximately 175 mph. In comparison other Junkers managed models, the Junkers jet air of the wing, in landing speed of somewhat less than 100 mph is reported.

All Junkers aircraft have the two-place 30-hp Junior to the front air-



Junkers Ju 60 high-speed transport for Luft Hansa

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The Junkers of the fuselage section and two pilots. Four of the passengers, two forward and two on a bench across the forward bulkhead, face aft. The details of the cabin fittings have been carefully worked out, but due to the narrow fuselage the space allotted for passenger storage has been American standards of comfort and convenience. There is no side aisle whatever and to reach the forward end, the passenger must fold down or climb over the rear seats.

General characteristics as furnished by the manufacturer are:

Length overall, 39 ft. span 47 ft. height 11 ft. 6 in. pushed 1,730 lb. weight loaded 6,890 lb. range approximately 3,535 miles.

Stearman B1 on floats

ON PAGE 184, AVIATION June 1953, appeared a complete description of a new Stearman B1 biplane pro-



The new Stearman B1 for Luft Hansa



Brewster BI on the field

designed by Stearns Aircraft of Wichita for general business and sport use. A slightly modified ship, the Model 80, has recently been tested and approved as a seaplane on Edo twin floats. The first modifications were made with very little attention to the basic structure; the cantilever struts which furnish most of the strength for the oleo legs of the land gear were used for attachment of the main float struts and a pair of extra struts on the lower fuselage provided for the rear struts. Standard Edo water rudders were used. As in the Model 80, a Pratt and Whitney T3A Wasp Junior of 420 hp. was installed. A Hamilton Standard controllable pitch propeller of the latest design was also fitted.

British engine with compression ignition

THIS Royal Air Force display at Hendon on Jan. 24, in the presence of the first prime, expansion of Bristol's air-cooled compression ignition engine. It was fitted in a Westland Wapiti principal purpose ship. The engine has been



Rear view of the Bristol Phoenix, a new Bristol compression ignition engine. Note the mounting of the fuel pump and the use of an electric starter.

under active development for the last six years and is the subject of some seven years of research work by the Bristol Aircraft Company. It has



NEW VOLUMES FOR THE SHELVES

AUGMENT AND THE LAW, by Harold L. Davies, *Author of "Lawyer, New York, 1931, 124 pages, \$2. The past twenty years have brought forth a great many books on air law for lawyers. This is the first competent work on air law for aviation and for the aviationist. It is a very limited space, and has covered it with what appears to be remarkable success. The history of air law, its international aspects, the responsibility of air carriers, the relation between Federal and State control, such minor matters as the legal status of a wedding ring in an aircraft, the responsibility of the supplier of an aircraft part which proves to be defective, the remuneration of the types of insurance with which aviation has to deal and of their legal position, and the law of contract drawn on its application to the sale of property are developed in separate parts are all*

ground in considerable detail. The covers of several of the offerings are available: offers of articles and short papers, the volume can be successfully recommended for reading. Lawyers will find their own opinions of its merit, but at least the reviewer can recommend it very strongly. It is, therefore, a book to be read. Among other virtues the book presents admirable outlines of its general subject matter, of the cases cited in illustration, and of the references to other authorities.

THE BOOK OF THE SEA, by Marlow Leach, *Author of "The Book of the Sea, New York, 1931, 124 pages, \$2. American from the point of view of a student of meteorology and of light and color. Several chapters are devoted specifically to such questions as sailing and air travel, but they are much less interesting and less valuable than the chapters that treat of clouds and winds and of sunset colors and why they exist. For pilots the book presents no particular value, even on the meteorological side for it is not sufficiently detailed and specific for their purposes. For the traveler by transport from which there is known something about the conditions in which he travels, on the other hand, it will make interesting and possibly easy reading.*

AVIATION August, 1931

less than about 200 hours on the track. No attempt has been made to boost the power output by using high expansion pressures and no special fuel measures have been specified. A gasoline of approximately 0.85 specific gravity used regularly by the Admiralty for motor trucks gives easy starting and smooth running. It is stated also that the engine's operation at idling speed is very satisfactory.

The Bristol Phoenix is a nine-cylinder radial engine of about 1,200 cc. in displacement working on the four-stroke cycle. Its maximum output is some 400 h.p. and the cruising power available at about 15 m.p.h. is 1,000 h.p. The wet dry weight is 900 lb. and the overall diameter 55 in. Comparing the engine with the Bristol Pegasus, the power plant used to the present day, the Bristol Phoenix is about 10 per cent lower in weight, the weight approximately the same, the power about one third less, the cruising load consumption some 25 per cent lower.

AVIATION August, 1931

TRANSPORT

Operations and Traffic Management

Keeping industry's wheels moving

MODERN communication and traffic conditions require new type industrial vehicles with more flexibility. Not long ago a cracked cylinder head on a six-cylinder diesel engine operating compressed machinery in the railroad district of New York City forced a service trip. At 2:30 p.m. a speed-limiting executive put through a phone call to the engine manufacturer at Cleveland, describing the difficulty and placing an emergency order for a replacement part. In spite of the fact that about one hour's maintenance was necessary before the M.A.B. cylinder head could leave the plant, the finished engine was turned over to the Western Express Agency and rushed across the city by truck in time to catch a 4 p.m. plane for New York. The ease and speed of the power offered considerable difficulty in showing away in the city's long baggage compartment, but the ship got off on schedule, arriving at Newark Airport on time, where the shipment was turned over to a waiting truck. Actual delivery was made in the destination in New York at 8:05 p.m., just under six hours from the time when the order was telephoned to Cleveland.

Teaching the young idea . . .

REALIZING that the children of today are the potential air leaders of the future, Lash Haines, Germany's premier aviation instructor, said in his Radio-Post transport article



U. S. Navy 3000-hp. turbo motor at United Airport, Los Angeles shortly after arrival from San Antonio on Western Air Express plane.

of regular United Air Lines and Western Air Express schedules, was able to contact him at his district office in seven days at a total cost of less than half a dollar, which would have been required by using perfect transportation.

The most novel feature of the expedition was the railway of sales managers at the airports on which he arrived by plane. This was appropriate not only from the method of travel, but also because his company handles equipment and material for airport and every use. It is obvious that a great deal of time was saved which might otherwise have been lost in traveling to

It seems there was an air traveling salesman

PERSONAL contact with a small army of salesman scattered over the entire western half of the United States was the result of a recent expedition according to 1931 travel budget statistics was the problem before T. Ross Hill, vice-president of American Electric Appliance Corporation of Toledo, Ohio, recently. Speed entirely suggested the airplane and with a little careful planning Vice-President Hill, making use

of regular United Air Lines and Western Air Express schedules, was able to contact him at his district office in seven days at a total cost of less than half a dollar, which would have been required by using perfect transportation. The most novel feature of the expedition was the railway of sales managers at the airports on which he arrived by plane. This was appropriate not only from the method of travel, but also because his company handles equipment and material for airport and every use. It is obvious that a great deal of time was saved which might otherwise have been lost in traveling to



Traveling German citizens get their first aerial transportation from Radio-Post's "Radio-Post" plane.

By air	
Fuel (\$1.00 per gallon)	15
Food (\$1.00 per meal)	15
Incidentals (\$1.00 per day)	20
Total	50
By motor transportation	
Fuel (\$1.00 per gallon)	15
Food (\$1.00 per meal)	15
Incidentals (\$1.00 per day)	20
Loss of time*	100
Total	150
Airfare (one-way)	100
Starling	100

*Minimum salary rate of \$1.00 per day

THE BUYERS' LOG BOOK

AVIATION'S Card Index of New Equipment

This department is designed to help readers decide which items of new parts, accessories or materials.

ACCESSORIES

Bearings, ball

The Taper Bearing Company,
Aero Division, Conn.

THE K series of double and aircraft ball bearings built to A-S standards has been extended to cover the range from 3/8 to 4 in. bore. To meet a demand for smaller bearings with smaller outside dimensions the K-3, K-4 series, etc. is introduced in 5/8, 1, 1 1/4 and 1 1/2 in. bores. Both series have metal seals extended over flanges and pre-lubricated and corrosion plated. (Aircraft Catalog)

Aircraft, August 1933

ACCESSORIES

Nuts, self positioning

Invalued Engineering Company,
837 Lake Street, Bridgeport, Conn.

SNAP-NUT, a patented device to prevent the use of too close screws or bolts in locations where ordinary nuts cannot be reached and held for driving. Automatically holds nut in proper position with respect to hole and prevents re-turning. Made for use with round flat or hex-nut round head screws in steel or brass. Useful for attachment of ribs, spacers, etc. (Aircraft Catalog)

Aircraft, August 1933

AIRPORT EQUIPMENT

Hose, gasoline

B. F. Goodrich Rubber Company,
Akron, Ohio

AIR-FLEX rubber coated gasoline hose with built-in steel reinforcement fittings. Made of tough black rubber with a built-in action hose can be easily slipped off and refitted in flexibility at freezing temperatures. Manufacturing process secures a rubber air contact gasoline stream. Permeable, strong, recommended for better application rate and air non-inflammable.

Aircraft, August 1933

AIRPORT EQUIPMENT

Lights, flood

The Poly-Aircoated Company,
1414 North Lincoln Ave., Chicago 12

THIS new Type AR100 6401 floodlight is 1 1/2 ft. high with the 3000 watt 115 volt Type 1244 being super-lamp. It is 36 in. diam with Aero-mat case cast aluminum, clear front and steel yoke and base and metal covers, fittings. The approved beam angle is 45 degrees at 8,000,000 ft. candelas, or a divergent beam with a 50 deg. spread may be fitted.

Aircraft, August 1933

MATERIALS

Lining, fuel tank

Thiokol Corporation,
1400 W. 3rd St.

THIOLACOL, a compound of ethylene dichloride and sodium polyvalent has been tested as a lining for aircraft fuel tanks. Reports (see Vol. 4 No. 14, Air Commerce Tribune, U. S. Department of Commerce) indicate that Thiokol-lined tanks may be about 25 per cent lighter, and may be dropped about twice as far as other types of lined tanks without burning.

Aircraft, August 1933

RADIO

Course indicator, visual

Rearrange Electric & Manufacturing Company,
1000 Pittsburgh, Pa.

DIAM TYPE indicator for instrument board mounting. 1/4 in. radio range, beacon response. Pointer shows course to right or left and response may be adjusted to fix a course at any predetermined angle to bearing course. Operates from single beam radio frequency receiver in compact mounting. A driving and filter permits continuous sound response on other frequencies.

Aircraft, August 1933

RADIO

Receiver, airplane

Rearrange Manufacturing Company,
1000 Pittsburgh, Pa.

ANOUNCEMENT has been made of a compact radio receiving set for private aircraft, not having a range of more than 225 to 750 ft. Model AR20 and AR25 are arranged for direct and remote control respectively for 12 volt battery operation. See tubes are used. Dimensions: 4 1/2 x 1 1/2 x 1 1/2 in. enclosed in mounting bracket. Weighs, complete with tubes and accessories, 33 to 12 lb.

Aircraft, August 1933

SHOP EQUIPMENT

Drill, electric

Independent Pneumatic Tool Company,
400 West Jackson Boulevard, Chicago 10

AN SMALL, used addition to the popular line of Thor electric drills has been announced. This tool has all the characteristics of the larger models, and will handle drills up to 1/2 in. diameter. Both complete at the time the motor is equipped with hand forward and back wound coils, and armature are mounted on ball bearings in both ends. Labeled for light steel metal work.

Aircraft, August 1933



**NO OTHER OIL IN THE WORLD
EVER MADE A RECORD LIKE THIS!**

FOR five straight years Kendall has been used in more winning places at the National Air Races than all other oils combined. . . . yes, several times as many as all other oils combined. And this year with a greater lead than ever before . . . 97.2% of all winners used Kendall.

And at the American Air Races in Chicago,

KENDALL
THE 30 HOUR OIL

MERELY MAINTAIN THE PROPER OIL LEVEL

Kendall repeated his winning record by being in 95.9% of all the winning places—only once was the showing made by all other oils combined.

Certainly here is positive proof of Kendall's remarkable superiority. For in air races, where open throttle and dialing speed is the order of the day, it takes a real oil to stand up and bring in the winners. Kendall does it . . . he kept right on doing it ever since the National Air Races because the Nudie's greater air speed of each year.

Follow the winners . . . use Kendall, the 30 Hour Oil. It wins in every test.

KENDALL REFINING COMPANY
BRADFORD, PENNA.

there's nothing like
TEXACO MARFAK
on this tough job



"Nothing can compare with it," say the operating men and airplane mechanics who have tried out and use Texaco Marfak Grease for difficult rocker-arm lubrication. It is a superior lubricant in every way.

Texaco Marfak Grease has extraordinary lubricating qualities under temperatures and pressures that quickly destroy the usefulness of ordinary greases. It lasts longer, by far, and has the power to cling to the bearing surfaces and stay soft. Texaco Marfak Grease is a mineral oil lubricant without a trace of filler. Try it. Leading commercial air lines use Texaco Marfak Grease exclusively.

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The Standard, Higher Flows and Speed and Fuel Economy



B.G.

ALL ENGINES,

with one exception, participating in the 1933
National Air Races at Los Angeles were B. G. equipped.

Of the 338 aircraft engines on the field during the period
of the races, 92% were B. G. equipped.

At the American Air Races, held at Chicago, 31 out of 38
engines in the competition were B. G. equipped.

All winners, runners-up and thirds were B. G. equipped.

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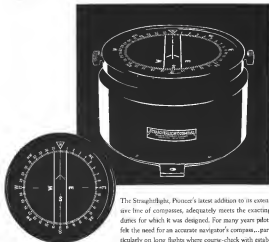
THE BOEING 247!



What could be more representative of the last word in transportation than the new "three-mile-a-minute" ten-passenger Boeing 247? . . . That is why it is on display in the dome of the Travel and Transport Building at the Century of Progress Exposition in Chicago. . . . Specifications of the 247 sent upon request. Boeing Airplane Company, Seattle, subsidiary of United Aircraft and Transport Corporation.



*BOEING has always built
tomorrow's airplanes today!*



The Straightflight, Pioneer's latest addition to its extensive line of compasses, adequately meets the exacting duties for which it was designed. For many years pilots felt the need for an accurate navigator's compass...particularly on long flights where course-check with established

land marks was not possible. And now, with the current system of "flying solely by instruments," the Straightflight attains even a greater importance as a directional instrument. Combined with the usual Pioneer features, the Straightflight embodies individual qualities which effect the desired characteristics for an ideal navigation compass...steady card...long period...no overshwing. These results are produced by maintaining a strong magnetic control over an extremely light and well-damped card. A spring suspension protects the card, pivot and jewel against damage by vertical vibration, and the new Pioneer anti-vibration mounting absorbs the horizontal vibrations which usually cause swifling of liquid and card oscillation. A large card, provided with parallel lines, makes it possible to take an accurate reading at a glance. The finest testimony to the Straightflight is exemplified in its approval by Army, Navy and transport pilots.

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~ 206 MILES PER HOUR



PERFORMANCE with 2 700 h.p. engines
 HIGH SPEED 1860 FT. 256 M. P. H.
 CRUISING SPEED 2000 FT. 215 M. P. H.
 LANDING SPEED 2000 FT. 115 M. P. H.
 SERVICE CEILING 12000 Ft.
 Take-off Distance with Full Load 675 ft.
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7 PASSENGERS
 Weight empty 22775 lbs.
 Fuelled and 42250 lbs.
 Payload 2100 lbs.
 Gross Weight 42280 lbs.
 Passengers with baggage 41 to 55
 Cargo Capacity 3000 lbs.
 Gasoline Capacity 580 gals.

Details on Request.

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Maximum Comfort and Vision

Quiet as a Pullman

*Full Head and Leg Room...
 No Obstructions*

*Fully Adjustable Lounge
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Stream-lined Cabin

*Complete Buffet
 and Ice Box*



AVIATION
 August, 1935

13



"Our 48 Engines did not miss a single explosion throughout the flight"

Stanavo Aviation Gasoline was used exclusively on this great flight. The Indian Air Ministry selected Stanavo after exhaustive tests had proved its uniform high quality and also because it was only through the world-wide facilities of the Stanavo organization that efficient refueling service could be obtained at the remote and isolated bases on the route.

There have been 56 successful trans-Atlantic flights since the introduction of Stanavo, and 11 have been powered with Stanavo. No trans-Atlantic flight with Stanavo has ever failed.

That is performance . . . that is dependability . . . that is a record no other aviation gasoline can even approach.



STANAVO AVIATION GASOLINE





Better control *for higher speeds*

There's an infallible solution to this problem of positive control no matter what the speed—use Fafnir Ball Bearings. The "feel" of controls never varies through hundreds of flying hours—never tighter—never sloppier. With a ball bearing control system, you enjoy lasting smoothness, dependability and operating economy.

With aviation engineers, Fafnir studied the problems involved. The resulting designs have stood the test of actual performance and are today specified by many of America's leading aircraft builders.

Whether it be for surface hinges, pulleys, bell cranks or any of the other numerous motions involved in control, you will find that Fafnir has the answer. The complete line is described in detail in the new Aircraft Booklet. As many copies as you can use are yours for the asking.

- THE FAFNIR BEARING COMPANY, New Britain, Conn.
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Wiley Post and 5 double-range products in record-making world flight



Wiley Post and Col. H. W. Gatty, aviation hero, Socomey-Vacuum, standing over the Wiley Post's record of 1931.

Mobilgas, 1500 double-range fuel, gave the Wiley Post full power under all conditions, all the way around.

Socomey-Vacuum Aircraft Instrument Oil, gave an accurate indication of speed, altitude, engine temperature, etc.

Socomey-Vacuum Compressor Fluid, the new non-corrosive, anti-oxidizing liquid, kept the Wiley Post's engine running strong all the way.

Mobilgrease, high temperature oil, kept the Wiley Post's engine running strong all the way.

Mobiloil, gave the Wiley Post protection in all kinds of weather in the Wiley Post's engine and the variable pitch propeller.

1 day, 18 hours, 49 minutes . . . New York to New York . . . with stops in Germany, Siberia, Alaska! Wiley Post relied on the double-range feature of 5 Socomey-Vacuum products in establishing the round-the-world solo record. He knew the feature meant economy under all kinds of punishment.



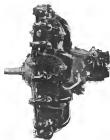
Mobilgas, Mobiloil, Mobilgrease, Socomey-Vacuum Compressor Fluid and Instrument Oil . . . again these products—by giving full power and protection at hot or cold temperatures, at high or low altitudes—proved their double-range qualities. Look for Socomey-Vacuum products at established airports.

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Careful planning and preparation were major factors in the success of Wiley Post's record making flight in the "Winnie Mae." The best and most dependable equipment was used. Logically, BREEZE RADIO IGNITION SHIELDING, BREEZE SHIELDING CONDUIT and BREEZE NON-MAGNETIC TACHOMETER DRIVE were selected for the "Winnie Mae."

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is light in weight, strong and vibration proof. It has been specially developed to meet the difficult conditions existing in aircraft service.

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This convenient device checks the synchronization of new engines to your battery system. It is portable and readily connected and is always accurate.

BREEZE TACHOMETER DRIVE is available in conventional or emergency type, and also in the new non-emergency type such as now used on the "Winnie Mae."

BREEZE SHIELDING CONDUIT and FITTINGS are commonly used for shielding and leading all lights and power lines in aircraft.



ROUND THE WORLD with the Automatic Pilot



The line referred to is where
telegram is the at supply line.

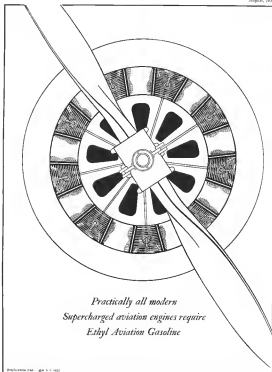
"The day when human skill alone and as
about half the crew of direction reached a
line to hold his course has long been through
a station might be a big one next. Commercial
Flying in the future will be automatic."

Quotation from M. Y. TIMES
Editorial of July 29th, 1933.

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A Stinson powered by Lycoming, looking up to its supercharged engine. Look for the Lycoming of the Stinson at 1933 Operators' Assoc. in Boston is a standard unit, you.

Veteran Commercial Flyers Prefer Stinsons

The Veteran Flyers crowd whom all private flying centers, on the airports of the country know their airplanes.

Years of experience with this and that type of aircraft has well fitted them to choose the plane which gives the best all-year-round service at the lowest cost.

Here's a significant fact. Eliminating absolute "orphan" types, there are more Stinson cabin planes. Powered by Lycoming, in constant use by commercial airplane operators than all other makes of modern four-passenger cabin planes COMBINED.

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AVIATION
August, 1933

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AVIATION

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For aircraft, boats, motor vehicles and motorcycles

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Lighting, signals, etc. for use in towing aircraft, boats, motor vehicles, etc. Also towing signs, etc. for use in towing aircraft, boats, motor vehicles, etc.

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For use in towing aircraft, boats, motor vehicles, etc. Also towing signs, etc. for use in towing aircraft, boats, motor vehicles, etc.

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